

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference DSH003	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/NZ2004/000337	International filing date (day/month/year) 23 December 2004	Priority date (day/month/year) 23 December 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. B65D 88/26 (2006.01) B65D 88/54 (2006.01) B65G 47/19 (2006.01)		
Applicant DSH SYSTEMS LIMITED et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a. ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability.
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 30 May 2005	Date of completion of this report 03 January 2006
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer ASANKA PERERA Telephone No. (02) 6283 2373

Box No. I **Basis of the report**

1. With regard to the **language**, this report is based on:
- ☒ The international application in the language in which it was filed
- ☐ A translation of the international application into _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1 (b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages **1-14** as originally filed/furnished
- pages* received by this Authority on _____ with the letter of _____
- pages* received by this Authority on _____ with the letter of _____
- ☒ the claims:
- pages as originally filed/furnished
- pages* as amended (together with any statement) under Article 19
- pages* **15-19** received by this Authority on **18 November 2005** with the letter of **18 November 2005**
- pages* received by this Authority on _____ with the letter of _____
- ☒ the drawings:
- pages **1/5-5/5** as originally filed/furnished
- pages* received by this Authority on _____ with the letter of _____
- pages* received by this Authority on _____ with the letter of _____
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NZ2004/000337

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-19	YES
	Claims	NO
Inventive step (IS)	Claims 1-19	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-19	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The cited prior art in the International Search Report do not disclose or fairly suggest an apparatus, a computer controlled process or a method as defined by independent claims 1, 11 and 15 respectively.

Therefore the subject matter of these claims and appended claims is new and meets the requirements of Article 33(2) PCT with regard to novelty.

The claimed invention is not obvious in the light of any of the cited documents nor is it disclosed in any obvious combination of them. It is also considered that it would not be obvious to a person skilled in the art in the light of common general knowledge either by itself or in combination with any of these documents.

Therefore the subject matter of these claims is not obvious and meets the requirements of Article 33(3) PCT with regard to inventive step.

CLAIMS:

1. A material discharge apparatus for controlling the discharge of flowable material being conveyed through a conical shaped hopper, the material to be continually discharged through the hopper until in feeding is stopped or ends, the hopper being configured and arranged, in use, to be operable at a height above a surface on which a discharge pile is to be formed, the apparatus including the hopper having an inlet opening adjacent the top and an open discharge outlet at the base of the hopper, the discharge outlet being exposed to the surrounding environment such that, in use, flowable material is discharged through the open discharge outlet, and a valve means being configured and arranged in the hopper, the valve means including a bulb having a lower end portion positionable adjacent the discharge outlet forming a gap between the inner wall of the hopper and the bulb for material, in use, to flow by being gravity fed therebetween and out through the open discharge outlet, the valve means and/or the hopper being adapted to move relative to the other, in use, for controlling the rate of continual discharge through the gap to form a solid column of flowing material to reduce the amount of dust being dispersed into the surrounding environment.
2. A material discharge apparatus according to claim 1 wherein the valve means is arranged in the hopper such that the lower end portion adjacent the discharge outlet is substantially centrally positioned such that the gap between the hopper and the valve means is evenly spaced about the lower end portion of the valve means, and wherein the discharge outlet is not closed by the valve means.
3. A material discharge apparatus according to claim 1 wherein the hopper is adapted to be suspended below a support frame by hopper support members, and wherein the valve means is adapted to be suspended below the support frame.
4. A material discharge apparatus according to claim 3 wherein the hopper is adapted to be suspended below a support frame by a plurality of spaced apart hopper support members, the hopper support members being elastic in form, in use, to expand under

the weight of material being conveyed through the hopper so as to increase the gap between the hopper and the valve means to increase the flow of material therethrough.

- 5 5. A material discharge apparatus according to claim 1 wherein the valve means includes a bulb having a lower end portion having a circular cross section, and wherein the hopper has a circular cross section that is tapered toward the discharge outlet.
- 10 6. A material discharge apparatus according to claim 1 wherein the hopper is adapted to be attached to a support frame and being adapted with a load cell transducer means configured and arranged to measure the weight of the hopper and generate a measurement signal that is forwarded to a valve control means, and a valve height adjustment means configured and arranged for attachment to the valve means and
15 being electrically connected to the valve control means and to receive command signals therefrom, the valve control means being adapted to receive, in use, a measurement signal from the transducer means and control movement of the valve means by the valve control means to raise and lower the valve means to increase or decrease the gap respectively between the hopper and the valve means.
- 20 7. A material discharge apparatus according to claim 6 wherein the valve control means includes a computer controller means programmed by a suitable computer program for controlling the operation of the valve height adjustment means, the controller means allowing a user to enter a preset weight setting for the hopper, and in use, the
25 controller means receives a digital measurement signal from the load cell means representing the weight of the hopper with material, and when the weight signal exceeds the threshold preset weight setting the controller means actuates the valve height adjustment means to raise the valve means to increase the gap and allow a higher discharge rate of material until the weight measurement signal from the load
30 cell means falls below the preset weight setting.

8. A material discharge apparatus according to claim 6 wherein the controller means actuates the valve height adjustment means to raise the valve means in predetermined incremental lift positions.
- 5 9. A material discharge apparatus according to claim 1 wherein the hopper is made of a rotary moulded plastics material.
10. A material discharge apparatus according to claim 3 wherein the hopper support members include coil springs, in use, that are expandable under the weight of lading
10 in the hopper.
11. A computer controlled process for controlling the flow rate of material conveyed through a hopper, the computer program including the steps of:
- 15 a. receiving a measurement signal from a load cell transducer means representing an actual measurement of weight of a hopper with material flowing therethrough and comparing the measurement against a preset measurement of weight representing a preferred flow rate through the hopper;
- 20 b. if the actual measurement of weight is more than the preset measurement of weight a control signal is sent to a valve height adjustment means to lift a valve means in the hopper to increase the discharge rate of material flowing through the hopper;
- 25 c. if the actual measurement of weight is less than the preset measurement of weight a control signal is sent to the valve height adjustment means to lower the valve means in the hopper to decrease the discharge rate of material flowing through the hopper; and
- d. resetting the program to repeat step a until the material has been discharged through the hopper.

12. A computer controlled process according to claim 11 wherein in step a. the program allows an operator to preset the number of measurements per minute taken by the load cell transducer means.
- 5 13. A computer controlled process according to claim 11 wherein in step a. if the actual measurement of weight is determined by the program to be the same as the preset measurement of weight the program will reset to step a.
14. A computer controlled process according to claim 11 using the apparatus of claim 6.
- 10 15. A method of controlling the flow rate of material conveyed through a hopper, the steps of the method including:
- 15 A. Comparing an actual measurement of weight of a hopper with material flowing therethrough with a preset measurement of weight representing a preferred flow rate through the hopper;
- B. if the actual measurement of weight is more than the preset measurement of weight, the valve means in the hopper is actuated to rise to increase the discharge rate of material flowing through the hopper;
- 20 C. if the actual measurement of weight is less than the preset measurement of weight the valve means in the hopper is actuated to lower the valve means in the hopper to decrease the discharge rate of material flowing through the hopper; and
- D. repeating step a until the material has been discharged through the hopper.
- 25 16. A material discharge apparatus according to claim 1 wherein the bulb includes a conical lower end portion, and a conical top portion with a circular cross section being tapered toward the top end portion forming an inverted cone on the lower end portion, the conical lower end portion being tapered toward the lower end of the bulb.
- 30 17. A material discharge apparatus substantially as herein described with reference to any one of the accompanying drawings.

18. A computer controlled process according to claim 11 substantially as herein described.
- 5 19. A method of controlling the flow rate of material conveyed through a hopper according to claim 15 substantially as herein described.